

Discussion and Notes

Electric circuit testers may be purchased at hardware stores or home supply centers. See also the product listing for the Electrical Safety Circuit Tester, Catalog No. SE9095 available from Flinn Scientific.

Electrical Safety

Electric shock is a serious safety hazard. Accidents involving electricity can cause severe shock, burns, and even death. Reviewing and following a few basic rules will help all science teachers greatly reduce electrical safety problems.

Electrical Safety Guidelines

Outlet Safety

1. Replace broken or scorched outlets immediately.
2. Use only ground fault interrupters (GFIs) in the lab. GFIs will protect you and your students from electrical shock. If older electrical outlets exist, they should be replaced as soon as possible with GFI type outlets.
3. Test all electrical outlets with a circuit tester once a year. We have found that one out of seven outlets in the school science lab is usually wired improperly.

Electrical Cords

4. Many laboratory chemicals, including organic solvents and corrosive substances, can damage electrical cords. Inspect the power cords on laboratory apparatus before use. Look for frayed wires or defective plugs. Remove any equipment with a damaged power cord from the lab until the cord can be repaired or replaced.
5. All electrical apparatus should be grounded through a three-prong plug. Never remove the third grounding plug from a power cord. If the plug only has two prongs, use an adapter and attach the ground wire to the screw that holds the outlet cover plate.
6. Never let power cords dangle from a lab bench. Students can easily trip or become entangled in the cord and thus inadvertently pull the apparatus to the floor.
7. When removing the power cord plug from an outlet, make sure your hands are dry and always pull the cord out by the plug. Do not "tug" on the power cord to pull the plug out of the outlet.
8. Use multiple outlet bars (power strips) only if they have fuse protection. Alternatively, some form of circuit breaker may be used.

General Rules

9. Do not use any electrical equipment powered by normal household current if there are bare wires exposed.
10. Keep the lab area dry when working with electrical lab apparatus. Never place electrical equipment near a water source unless the equipment is grounded and plugged into a GFI outlet.
11. Never use human subjects to demonstrate the effect of electrical shock. If using a Van de Graaff generator, follow all safety precautions.
12. Avoid using extension cords. If an extension cord must be used, make sure it is a standard three-prong extension cord with a sufficient rating for the electrical equipment being used. Should the plug of an extension cord ever become warm, it is probably overloaded. Extension cords are intended for temporary use only.

Discussion and Notes

13. All teachers should know the location of the electrical shut off switch or circuit so power can be turned off to the lab. Know how to turn the power off in your lab. Consult with the building maintenance staff for more information.
14. Sparks from electrical apparatus can ignite flammable liquid vapor. Be very careful using flammable liquids around or near electrical equipment, such as hot plates, etc. Work with volatile, flammable liquids only in a well-ventilated lab to prevent the buildup of flammable vapors.
15. If water or a chemical is spilled on the electric apparatus, immediately shut off the power to the apparatus and unplug the power cord from the outlet.
16. When using electrical apparatus in a fume hood, make sure the power cord is plugged into an outlet outside of the fume hood.
17. Always unplug electrical apparatus before making any repairs. Before you reconnect the equipment to the power source, make sure the equipment has been tested with a multimeter to ensure it is still properly grounded.
18. If a person is in contact with a “live” electrical connection, unplug the power cord from the outlet, and then administer first aid.
19. Do not overload electrical circuits. Look at the power requirement of each electrical apparatus being used and compare that value to the power available on the circuit. The apparatus label or instruction manual will usually indicate the power requirement needed. If the lab is on a 15-amp circuit, you have 1,800 watts of power. A 20-amp service has 2,400 watts of power.
20. You and your students should always familiarize yourself with the electrical device you are about to use.
21. Make sure all electrical apparatus is turned off before it is plugged into the outlet. Similarly, turn off all electrical equipment before unplugging.

Flinn Scientific Values Your Support

Flinn Scientific has provided these Science Department Safety Training Notes. Without your orders, the safety training notes and the indispensable *Flinn Scientific Catalog/Reference Manual* would not be possible. Please continue to support our efforts to improve safety in school science labs by sending Flinn Scientific your valuable orders.

Next Month's Topic

Housekeeping Is a Safety Issue

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Electrical Safety

Electrical safety is an often overlooked topic in school science labs. Electric shock is a serious safety hazard, however—accidents involving electricity can cause severe shock, burns, and even death. We have developed a set of electrical safety guidelines to help teachers reduce the risk of electrical accidents.

This safety meeting should take only 8–10 minutes to present. The discussion period will vary depending on the issues that need to be addressed.

It is important to keep a copy of these safety training notes and a signed attendance sheet to verify that regular safety training meetings were held. The sign-up sheet is almost as important as the training notes and is usually the first thing that is requested and reviewed by regulatory inspectors. A copy of the sign-up sheet that we suggest using may be found at www.flinnsci.com/Sections/Safety/SNotes/signup.pdf.

Materials (one per staff member)

- ◆ Flinn Scientific Science Department Safety Training Notes, Volume 9–5
- ◆ Sign-up Sheet (one for group)

Questions for Discussion

1. Have the electrical outlets in the lab area ever been checked? Should they be retested? Whose responsibility is it to test the electrical outlets?
2. Are GFI outlets installed throughout the lab? If not, how do we get GFI outlets installed?
3. Test GFIs on a regular basis. Simply press the red “test” button and the power should be disrupted.
4. Are extension cords being used as permanent wiring solutions? Inspect, review, and make any necessary changes.
5. Discuss any instances where the laboratory power requirements were overloaded. Do we ever “trip” the circuit breakers?
6. Do all teachers know how to turn off the power to their labs?

We Welcome Your Comments

Are the Science Department Safety Training Notes useful to you? Are they working for you and your department? Do you have any suggestions for topics that you would like to see covered or for how we can improve these notes? We really want to hear from you! Please e-mail us with your comments and suggestions. Our e-mail address is flinn@flinnsci.com.